

CLAIMS

What is claimed is:

1. An apparatus, comprising:
 - a first die;
 - a first position adjustment mechanism to adjust a position of the first die along a first axis; and
 - a first flexure member coupled to the first die and to the positional adjustment mechanism, the first flexure member to maintain coupling with the first die during movement of the first die along a second axis perpendicular to the first axis.
2. The apparatus of claim 1, wherein the first position adjustment mechanism comprises a spindle and wherein the first flexure member is a flexure rod, the flexure rod coupled to the spindle.
3. The apparatus of claim 2, wherein the first flexure rod has a thread and the spindle has a thread receiver, and wherein the first flexure rod is coupled to the spindle using the thread and thread receiver.
4. The apparatus of claim 3, wherein the first position adjustment mechanism further comprises a motor coupled to the spindle to rotate the spindle.
5. The apparatus of claim 4, wherein the motor comprises a worm reduction gear.
6. The apparatus of claim 1, further comprising:
 - a target coupled to the first die;
 - a second die; and
 - a sensor coupled to the second die to determine the position of the first die with respect to the target.

7. The apparatus of claim 1, further comprising:
a thrust pad coupled to the first die through a gas bearing during an initial range of travel of the thrust pad.
8. The apparatus of claim 7, further comprising:
a thrust rod pivotally coupled to the thrust pad, the thrust rod comprising a gas inlet and a vacuum ring outlet.
9. The apparatus of claim 8, wherein the gas inlet is configured to direct gas between a gas bearing surface of the thrust rod and the first die.
10. The apparatus of claim 7, further comprising:
a bell crank coupled to the thrust rod; and
a bladder actuator coupled to the bell crank using a toggle link.
11. The apparatus of claim 1, further comprising a second flexure member coupled to the first die.
12. The apparatus of claim 11, further comprising a second position adjustment mechanism to adjust the position of the first die along a third axis.
13. The apparatus of claim 12, wherein the first and second flexure members are flexure rods and wherein the first position adjustment mechanism comprises:
a first spindle coupled to the first flexure rod; and
a first motor coupled to the first spindle to rotate the first spindle; and
wherein the second position adjustment mechanism comprises:
a second spindle coupled to the second flexure rod; and
a second motor coupled to the second spindle to rotate the second spindle.

14. The apparatus of claim 13, wherein each of the first flexure rod and the second flexure rod has a thread, wherein each of the first spindle and the second spindle has a first thread receiver, the thread and the thread receiver to couple a respective flexure rod with a respective spindle.

15. The apparatus of claim 14, wherein each of the first and second motors comprises a worm reduction gear.

16. The apparatus of claim 12, wherein the first axis is substantially perpendicular to the third axis.

17. The apparatus of claim 16, further comprising a single thrust rod configured to apply a force to the first die along the second axis, wherein each of the first axis and the third axis lie in a same plane being substantially perpendicular to second axis.

18. The apparatus of claim 1, wherein the positional adjustment mechanism is coupled to the first flexure member to adjust the position of the first die along a third axis.

19. The apparatus of claim 18, wherein the first flexure member is a blade.

20. The apparatus of claim 19, wherein the positional adjustment mechanism comprises a first axis slide coupled to the first flexure member and a third axis slide.

21. The apparatus of claim 20, wherein the positional adjustment mechanism further comprises:

a first motor coupled to the first slide to adjust the position of the first die along the first axis; and

a second motor coupled to the third axis slide to adjust the position of the first die along the third axis.

22. The apparatus of claim 21, wherein the first motor and the second motor are a same motor.

23. A method, comprising:

providing a die; and

aligning the die with a surface along a first axis using a first flexure member.

24. The method of claim 23, further comprising aligning the die with the surface along a second axis using a second flexure member.

25. The method of claim 24, wherein the first axis is substantially perpendicular to the second axis.

26. The method of claim 25, further comprising:

pressing the die in a direction perpendicular to the first and second axes while maintaining coupling of the die with the first and second flexure members.

27. The method of claim 26, wherein maintaining coupling comprises flexing the first and second flexure members during the pressing.

28. The method of claim 27, wherein aligning comprises adjusting a position of the die along at least one of the first axis and the second axis.

29. The method of claim 28, further comprising detecting an offset in the position of the die using a target, coupled to the die, and a sensor.
30. The method of claim 29, wherein adjusting comprises adjusting the position of the die using a servo control system.
31. The method of claim 29, wherein adjusting comprises linearly displacing the first and second flexure members along the first and second axes, respectively.
32. The method of claim 23, further comprising:
raising the die; and
maintaining coupling between the die and the first flexure member during the raising.
33. The method of claim 32, wherein the die is raised using a floating linkage coupled between the die and a thrust pad.
34. The method of claim 26, wherein the first axis is substantial normal to the direction the die is pressed.
35. The method of claim 23, further comprising:
aligning the die with the surface along a second axis using the first flexure member; and
pressing the die in a direction perpendicular to the first and second axes while maintaining coupling of the die with the first flexure member.
36. The method of claim 35, wherein maintaining coupling comprises flexing the first flexure member during the pressing.

37. The method of claim 36, further comprising:
raising the die; and
maintaining coupling between the die and the first flexure member during the raising.
38. An apparatus, comprising:
a die coupled to a first flexure member;
means for aligning the die with a surface along a first axis using the first flexure member;
means for pressing the die; and
means for maintaining contact between the die and the first flexure member during the pressing.
39. The apparatus of claim 38, further comprising means for aligning the die with the surface along a second axis using the first flexure member.
40. The apparatus of claim 38, further comprising means for aligning the die with the surface along a second axis using a second flexure member.
41. The apparatus of claim 40, further comprising means for maintaining contact between the die and the second flexure member during the pressing.
42. The apparatus of claim 40, further comprising means for moving the die in a direction substantially perpendicular to the first and second axes using a single thrust rod.